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Impact of High Natural Background Radiation on Woman's Primary Infertility

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Abstract: The main goal of the present study, is to examine the women's primary infertility rate of high natural background radiation among the residents of Ramsar, one of the inhabited areas with highest natural background radiation. This report summarizes the data obtained from 155 residents of high natural background radiation area (case group) and 800 residents from an ordinary radiation area (control group). Overall data showed rates of primary infertility in high and ordinary natural background radiation areas were 11 and 3%, respectively. There was significant difference in the rates of infertility in two groups. Results also showed statistically significant difference between level of education and employment status with primary infertility rate in two groups.

Key words: Primary infertility, natural background radiation, Ramsar

INTRODUCTION

Ramsar, a northern coastal city of Iran, has been the subject of radiological studies for many years. Based on the recent criteria, the areas with elevated Naturally Occurring Radioactive Materials (NORM) in Ramsar have been classified as a High Levels of Natural Radiation Areas (HLNRA). In this city, Tallesh Mahalleh and Chaparsar have the highest radiation levels (Ghiassi-Nejad *et al*., 2002). High Background Radiation (HBR) has drawn researcher's attention for years. The effects of the low doses of radiation on human health are questionable and still the matter under discussion. Ramsar involves the highest background radiation among the whole residential areas in the world. So far the reported maximum dose is 98.5 mSv year^{-1} in Ramsar (Monfared, 2005). More radiobiological studies carried out on radiation effects on human health such as cancer, but comprehensive studies was not down about impact of radiation on infertility rate in Ramsar. The purpose of this research is to study rate of woman's primary infertility of the inhabitants of high background radiation area, compared with inhabitants who live in the ordinary background radiation area.

MATERIALS AND METHODS

Ramsar is divided into eight health districts and a health center provides primary health services in each health district. From among the whole inhabitants in Talesh Mahalleh and Chaparsar as high background radiation area and other districts as ordinary background radiation area, 165 (case group) and 845 (control group) women were selected, respectively, matching on some variables like age, fertility position, etc. The subjects whose permanent residency was not in the study areas were excluded from the study. Total populations under study were 155 in case group and 800 in control group. After explaining the aim of the project to the individuals and obtaining their consent, standard questionnaires were completed through interview and available data in local health centre. Primary infertility rates evaluated in these two groups. Effective factors on infertility such as level of education, marriage duration and employment status among the residents of two areas were compared. Statistical assessment of data was performed by using the SPSS 9.0 software.

RESULTS

In our study 955 women (155 as the case group and 800 as the control group) were in age range, 30-50 years, mean age, 37 years. Our findings demonstrate the primary infertility rates were 11% in the case group and 3% in the control group. There was significant difference in the rates of infertility in 2 groups ($p = 0.001$). In the case group, 68.4% were not complete secondary school, 20.6% were illiterate and 11% had university graduated. These rates in the control group were 59.1, 36.75 and 4.1%, respectively. By using Chi square test, there was statistically significant relationship between primary infertility rate and levels of education ($p = 0.000$). 83.9% in case group and 92.25% in control group were unemployee. The relationship between infertility and

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Table 1: Marriage duration in populations

Years	Case group	Control group
<5	24	8
5-9	32	10
10-14	100	25
15-19	154	33
20-24	200	32
>25	290	47

By using Chi square test there was no significant difference between infertility with marriage duration (p = 0.153)

employment status were assessed by Fisher's exact test, there was statistically significant difference between these two variables (p = 0.001). Marriage duration in case and control groups is showed in (Table 1).

DISCUSSION

Inhabited areas with high levels of natural radiation are found in Yangjian, China, Kerala, India and Guarapari, Brazil. Ramsar is a beautiful northern city in Iran overlooking the Caspian Sea, has some areas with one of the highest levels of natural radiation studied so far. Geographical location of Ramsar is illustrated in (Fig. 1).

People in some areas of Ramsar, receive an annual effective radiation dose from background radiation of up to 260 mSv year^{-1}, which is substantially higher than the 20 mSv year^{-1} that is permitted for Iranian radiation workers (Ghiassi-Nejad *et al*., 2002). The people who live in these high radiation areas are of considerable interest because they and their ancestors have been exposed to abnormally high radiation levels over many generations (Karam *et al*., 2002). As the biological effects of low doses of radiation are not fully understood, the current radiation protection recommendations are based on the predictions of an assumption on the Linear, No-Threshold (LNT) relationship between radiation dose and the carcinogenic effects (Mortazavi *et al*., 2002). The results of some radiological studied in Ramsar and its Elevated Natural Radiation Areas (ELNRAs) carried out over a decade ago on public doses and health-related and biological effects were reported before (Sohrabi and Esmaili, 2002). A brief review concerning the studies of infertility rate in high background radiation areas was presented. We could find too few similar researches to ours in high natural radiation areas in the other countries of world. In present approach mainly identify the potential and known impacts of exposures in ELNRAs, of this region on women's primary infertility. Primary infertility rate in the HBR residents was considerably less than in the area with ordinary background radiation. previous study reported that women who received abdominal pelvic radiation may be at an increased risk of being infertile. They indicated there was evidence that the risk of infertility increased with increasing amount of abdominal pelvic radiation

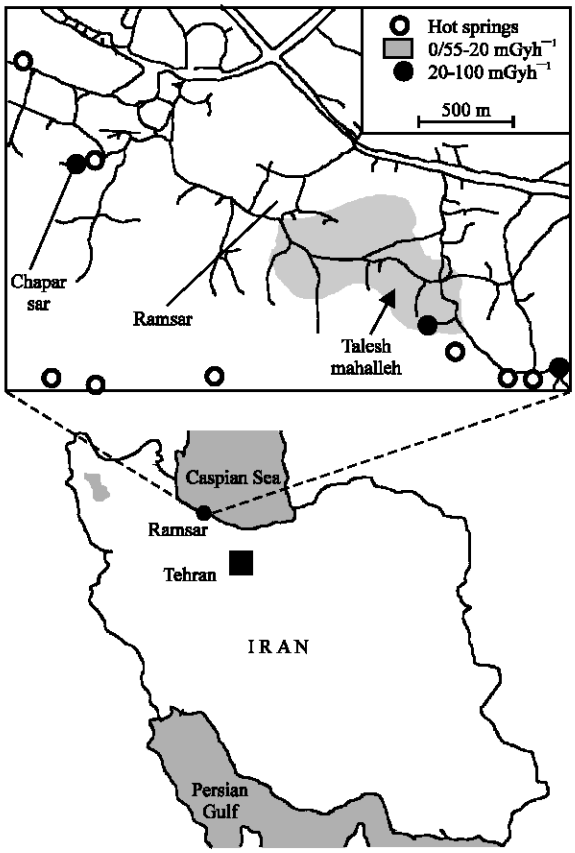

Fig 1: Geographical location of Ramsar region

(Chiarelli *et al*., 1999). A cross sectional analysis of reproductive outcome was reported in on occupational cohort of nuclear industry workers from the Atomic Energy Authority, Atomic Weapons Establishment and British Nuclear Fuels in the United Kingdom. 3.7% of women reported primary infertility (Doyle *et al*., 2001). There was evidence that the fertility deficit rises significantly with increasing dose of abdominal pelvic radiation. Women who received abdominal pelvic radiation may be at an increased risk of being infertile (Chiarelli *et al*., 1999).

CONCLUSION

Findings of this study indicate that women's Primary infertility rate in the HBR residents was considerably less than in the area with ordinary background radiation.

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